

REMARKS

Claims 2-45 are pending, with claims 2, 8, 14, 20, 29, 36, and 41 being independent. Claims 1 and 46-48 have been cancelled.

Claims 2-45 are rejected under 35 U.S.C. 112(1). Claims 2-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,712,191 to Nakajima et al. (Nakajima) in view of U.S. Patent No. 5,771,110 to Hirano et al. (Hirano), U.S. Patent No. 6,051,512 to Sommer et al. (Sommer), and U.S. Patent No. 5,309,022 to Gill et al. (Gill).

Rejections under 35 U.S.C. 112(1)

All of claims 2-45 are rejected under 35 U.S.C. 112(1) under two separate bases. First, the Office Action maintains that the "specification is limited to crystallization of silicon with a catalyst material. This limitation is not found in the instant claims." Second, the Office Action maintains that "there is no support for the limitation of a peak temperature as is now claimed."

In response to the first of these two rejections, Applicant notes that the burden of establishing lack of written description rests with the Examiner, and that a rejection issued on this basis require express findings of fact that (A) identify the claim limitation at issue; and (B) establish a prima facie case as to why an artisan of ordinary skill would not have recognized that Applicant was in possession of the claimed invention in view of the disclosure as filed (see MPEP 2163.04(I), and more generally, MPEP 2163).

In this case, the statement that a particular limitation is "not found in the claims" fails to address the pertinent issue, i.e., a limitation that is in the claims that is (allegedly) not described in the specification such that an artisan of ordinary skill would have recognized Applicant's possession thereof. In fact, to the contrary, Applicant submits such an artisan would have recognized that all of the claimed elements were in Applicant's possession for purposes of patentability.

Specifically, for example, with respect to the various independent claims 2, 8, 14, 20, 29, 36, and 41, the recited features of the structure and operation of the claimed heating lamps as they act upon a film would all have been (in fact, conveniently) obtainable by one of ordinary

skill, based on the present description and in conjunction with those ordinary skills. In particular, there is no claim term(s) in any of the above-recited independent claims, or in any of the pending claims, that depend on an application of a catalyst material. Indeed, as already pointed out, the present rejection points to the absence of a term in the claims, rather than to an existing, non-supported claim term.

In contrast, and regarding the second rejection under 112(1) referred to above, the claim term(s) "peak temperature" are identified as being allegedly non-supported. For example, claim 2 recites, "irradiating said semiconductor film by scanning with at least first and second pairs of linear infrared lights in a predetermined direction, **peak of a temperature of the second pair of linear infrared lights are higher than peak of a temperature of the first pair of linear infrared lights...**"

Although here the first step of identifying the claim terms at issue has been taken, Applicant respectfully submits that the second step of establishing non-possession by Applicant is not addressed. In particular, Applicant respectfully directs the Examiner's attention to FIGS. 6A and 6B, and the corresponding discussion of those figures at page 14, lines 15-25, as well as the general discussion of a use of linear infrared lights at, for example, page 6, line 4 to page 8, line 12 (also see FIGS. 1A, 1B, and 1C).

In short, Applicant submits that it is clear that lamp pairs 601 and 603 are used for heating, and thus output a raised temperature relative to ambient air. As a result, as described throughout the specification, a temperature gradient is created in the underlying semiconductor film, in which, as shown in FIG. 1C, a peak temperature is generated in the film that corresponds to, and moves with, the over-lying infrared heat lamp 107.

Similarly, in FIGS. 6A and 6B, each of the lamp pairs 603 and 601 generate a peak temperature in the film 604. Since lamp pairs 601 are illustrated as using reflective shields 602, and as clearly illustrated in FIG. 6B, the peak temperature of those lamps in the film 604 will consistently be higher than the peak temperature associated with the lamps 603.

Based on the above, Applicant respectfully submits that an artisan of ordinary skill at the time of the claimed invention would have understood that a temperature at a position of the main

lamps 601 would have been a peak temperature, that a temperature at the auxiliary lamps 603 would have been another peak temperature, and that the latter peak temperature would have been less than the former.

In a third and final rejection based on 35 U.S.C. 112(1), the Office Action rejects claims 2-19 for failing to "recite the crystallization of amorphous silicon...the claims merely recite treating a layer, which is not limited to crystallization as is the specification." In response, and similarly to the first-discussed 112(1) rejection above, Applicant again respectfully submits that Applicant is entitled to claim any patentable feature(s) possessed by Applicant at the time of filing that are described in the specification.

In particular, the claimed structure and operation of the various heating lamps would have been easily implemented by one of ordinary skill, and this implementation(s) could have been performed using, in the example of independent claim 2, "... a semiconductor film comprising silicon (formed) over a substrate." As already pointed out in Applicant's previous response(s), one example of such a situation is illustrated at page 14, lines 4-6.

Based on the above, Applicant respectfully submits that the rejections under 35 U.S.C. 112(1) are invalid, and requests that they be withdrawn.

Rejections under 35 U.S.C. 103(a)

Regarding the rejection of claims 2-45 under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Hirano, Sommer, and Gill, Applicant respectfully submits that Nakajima is inaccurately described and does not provide the teachings alleged in the present Office Action, and that none of the Hirano, Sommer, or Gill references cure the deficiencies of Nakajima.

For example, independent claim 2 recites:

A method for manufacturing a semiconductor device comprising:
forming a semiconductor film comprising silicon over a substrate; and
irradiating said semiconductor film by scanning with at least first and second pairs of linear infrared lights in a

predetermined direction, peak of a temperature of the second pair of linear infrared lights are higher than peak of a temperature of the first pair of linear infrared lights,

wherein upper lights of the first and second pairs of said linear infrared lights are located over said substrate and lower lights of the first and second pairs of said linear infrared lights are located at a backside of said substrate.

Nakajima discloses a multi-step process for producing a thin film transistor, in which (a) an amorphous Si film is formed on a substrate, (b) a metal or portion is formed with respect to the amorphous Si film, (c) the metal layer or portion is patterned (e.g., to form an island-like layer), (d) the amorphous Si film is patterned, (e) a laser light is irradiated while moving the laser in a direction from the patterned metal layer/portion toward the patterned amorphous Si film (simultaneously, the substrate may be heated) (see, for example, Abstract; column 8, lines 14-49; column 12, lines 14-56).

The Office Action asserts that Nakajima discloses that “a laser or heat source is started at the place where the metal and the amorphous material are in contact to create a temperature gradient. The laser is then moved across the layer to crystallize the amorphous material by temperature gradients, note entire reference.”

However, nowhere in the “entire reference” of Nakajima is such a temperature gradient disclosed. Applicant notes that the presence of the laser of Nakajima does not imply a temperature gradient. For example, Applicant notes at page 5, lines 5-9 that a laser such as an ultraviolet pulse laser light does not form a temperature gradient.

Moreover, none of the cited reference of Nakajima, Hirano, Sommer, or Gill disclose “scanning with at least first and second pairs of linear infrared lights in a predetermined direction,” where the first and second pairs of lights are above and below the recited film, as claimed. Rather, Nakajima discloses the scanning laser lights above the surface of a film, while Nakajima and all of the remaining cited references disclose stationary heat sources below (and/or above) the relevant film(s), where the heat is provided uniformly. As a result, none of Hirano, Sommer, or Gill disclose or properly suggest the claimed temperature gradient.

Additionally, none of the cited references disclose or properly suggest the recited peak temperatures and the relationship therebetween. Indeed, the Office Action does not assert that the references disclose or properly suggest these claim limitations. Rather, the Office Action relies on the above-discussed 112(1) rejections, which, as pointed out above, are improper.

In short, none of the cited references, alone or in combination, disclose or properly suggest at least (1) the claimed temperature gradient(s), (2) the claimed pairs of moving heat sources located above and below a heated film, or (3) the recited peak temperatures and the relationship therebetween.

Therefore, independent claim 2, as well as dependent claims 3-7, are believed to be allowable for at least these reasons. Independent claims 8, 14, 20, 29, 36, and 41 (as well as respective dependent claims 9-13, 15-19, 21-28, 30-35, and 37-40), which contain at least the same or similar limitations, are believed to be allowable for at least the same reasons.

Finally, independent claims 29 and 36 also generally recite that wherein a direction of the claimed temperature gradients is "...coincident with a direction of crystal growth to be proceeded in the semiconductor film." In contrast, Nakajima discloses, as shown in FIG. 1, the patterned metal layer 101 is formed in contact with the patterned amorphous Si film 102, where the film 102 has "a shape that the patterned area gradually increases (at a pre-determined angle θ) from the region in contact with the layer of the metal element" (see column 3, lines 50-57).

Nakajima discloses that the angle θ defines the direction of crystal growth, and further discloses that the fact that the sides of the patterned film (e.g., sides 600 in FIG. 6B) are provided approximately along the direction of crystal growth is important factor for realizing a large single-crystalline structure (see column 3, lines 58-67 and column 10, lines 10-16).

Therefore, Nakajima does not disclose the limitation that a temperature gradient "...direction is coincident with a direction of crystal growth to be proceeded in the semiconductor film." Accordingly, independent claims 29 and 36, as well as their respective dependent claims 30-35 and 36-40, are believed to be allowable for these additional reasons.

Based on the above, all claims are believed to be in condition for allowance, and such action is hereby requested in the Examiner's next official communication.

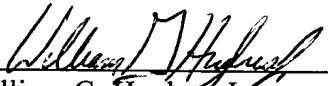
Applicant : Hisashi Ohtani
Serial No. : 09/596,755
Filed : June 15, 2000
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Attorney's Docket No.: 07977-226002 / US3548D1

Enclosed is a \$110.00 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: October 23, 2003



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